

Latest applications and developments of OMI OMAERO aerosol data

focus on the aerosol absorbing index

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Aura Meeting

27 Sep 2010

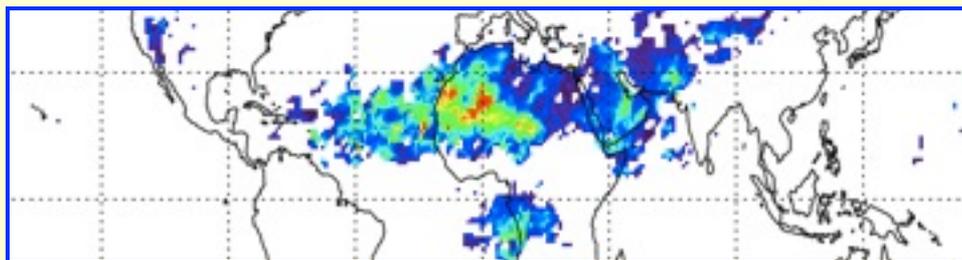
Boulder, Colorado

Overview

- Comparison of AAI for OMI and SCIAMACHY
 - Global results
 - Episodic vs. Persistent Aerosol Source Regions
 - Regional studies
 - Focus on Africa
- Case study comparison AAI: OMI and GOME-2
 - Volcanic Eruption Apr-May 2010
- Averaging Kernels: a way of AAI quantitatively
- Summary & Conclusions

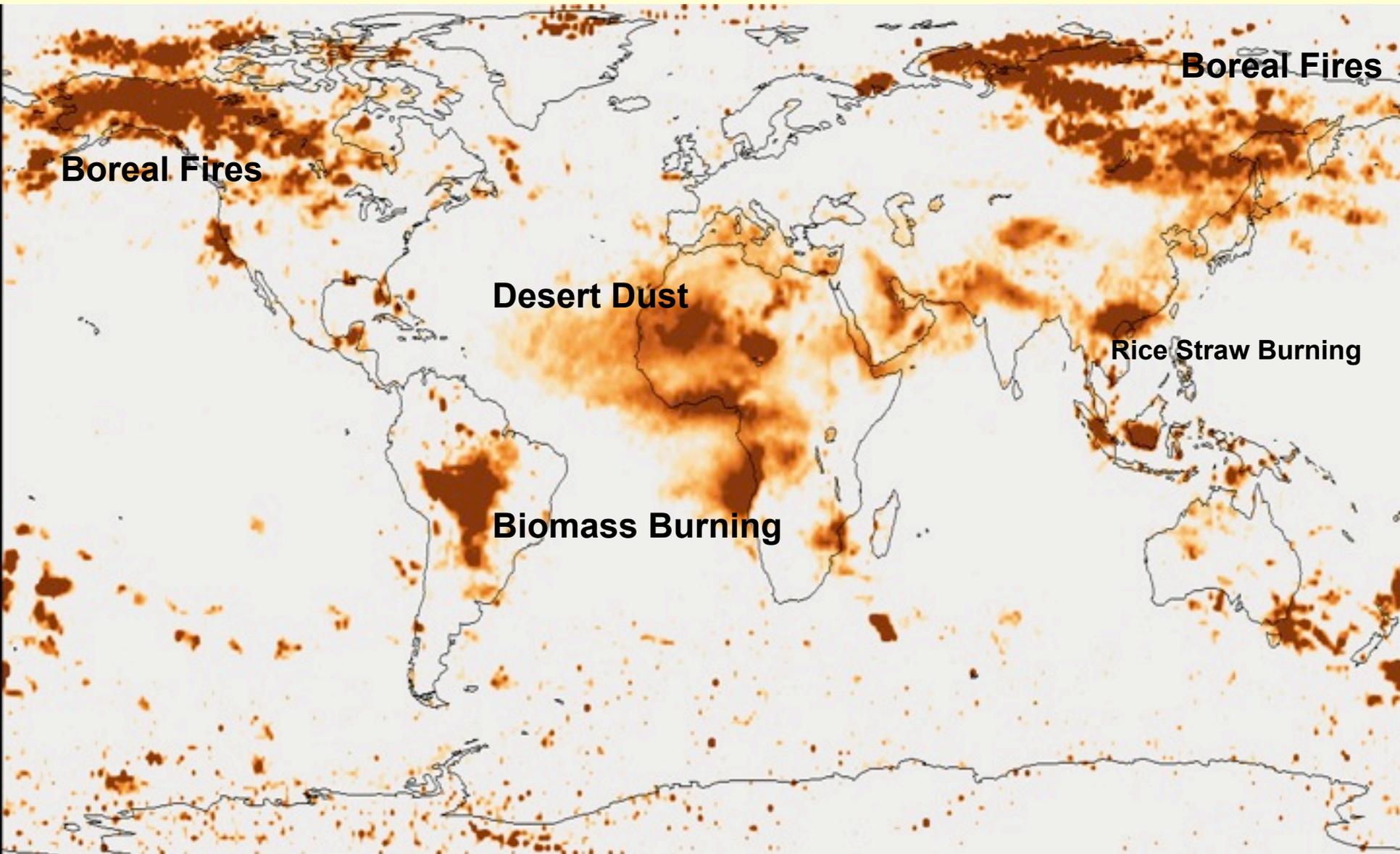
Aerosol Index: What is it?

- Definition – scene color in the UV based on a ratio of measured reflectances at a given wavelength pair compared to simulated Rayleigh-reference atmosphere
 - Results in residual value where,
 - Aerosol Index > 0 Absorbing Aerosol (Dust & Smoke)
 - Aerosol Index = 0
 - Aerosol Index < 0 Clouds or Scattering Aerosols



- TOMS heritage record going back to 1979, designed as a diagnostic for the TOMS ozone product.

Maximum AAI values from SCIAMACHY for 2002-2008



SCIA vs. OMI – AAI measurements

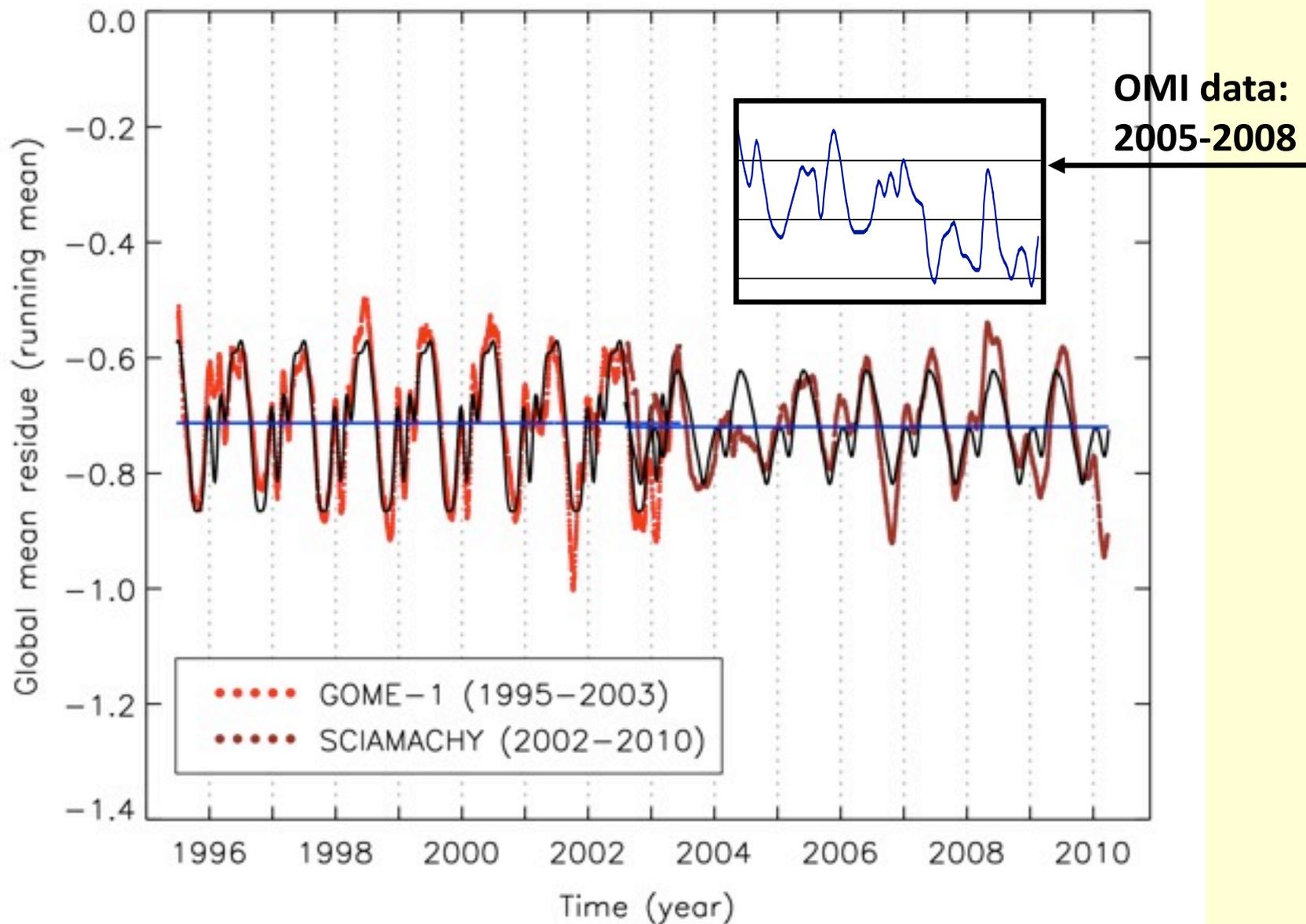
	Wavelength pair (nm)	Pixel size at nadir (km)	Days needed for global coverage	Platform / Operation Dates
SCIAMACHY	340 / 380	60 x 40	6	Envisat (2002 - present)
OMI	354 / 388	13 x 24	1	Aura (2004 - present)

- **SCIAMACHY** – **SC**anning **I**maging **A**bsorption spectro**M**eter for **A**tmospheric **CH**artograph**Y**
- **OMI** – **O**zone **M**onitoring **I**nstrument

Methods for this comparison study

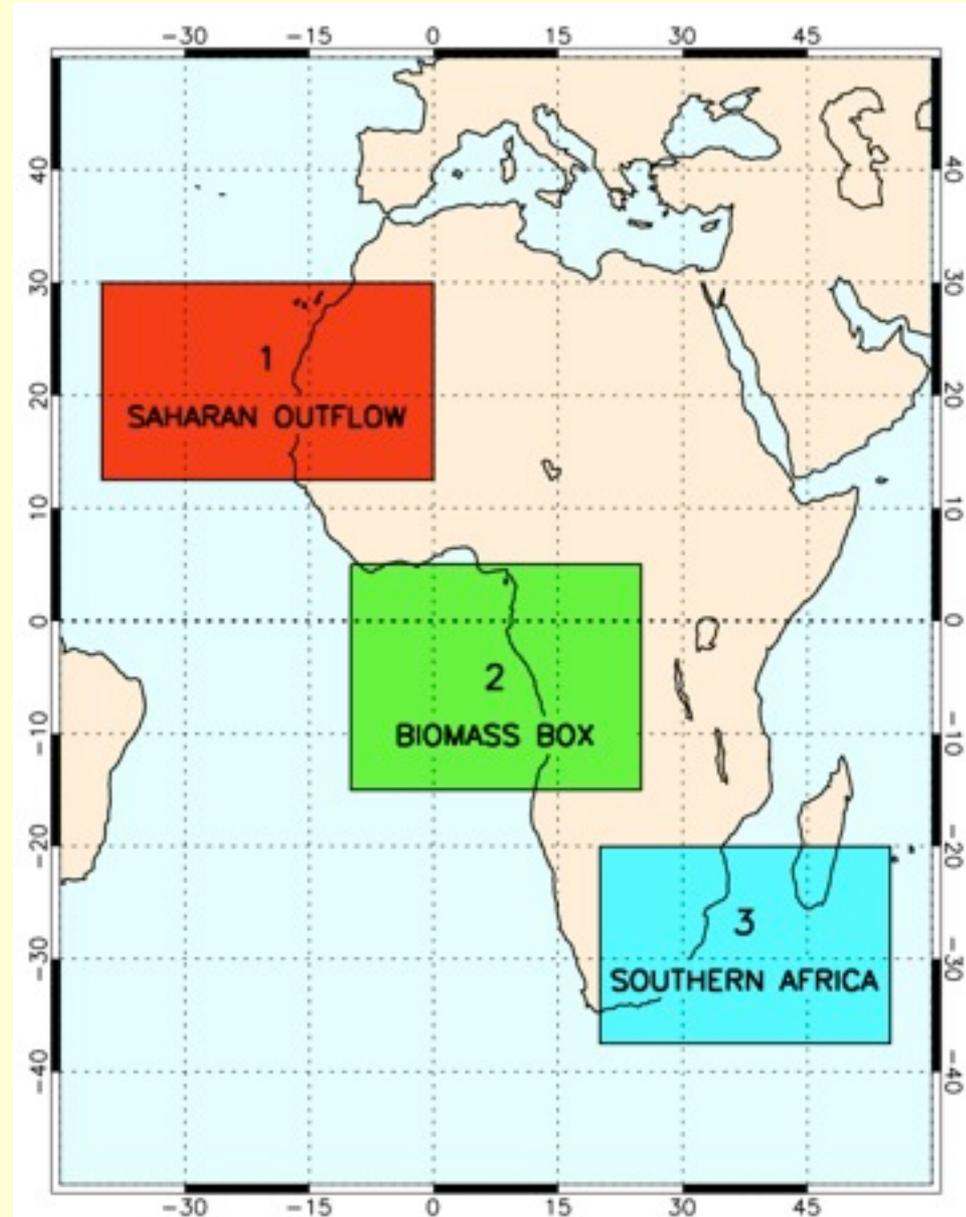
- Compare OMI AAI data from 2005-2008 to combined time series
 - Stop at 2008 (for now) to eliminate Row Anomaly
- Conditions of comparison
 - 1 x 1 degree re-gridded data
 - No solar zenith angle $> 60^\circ$
 - Sun glint removed
- Check this on global, regional scales

Global Results: Time series of mean AAI

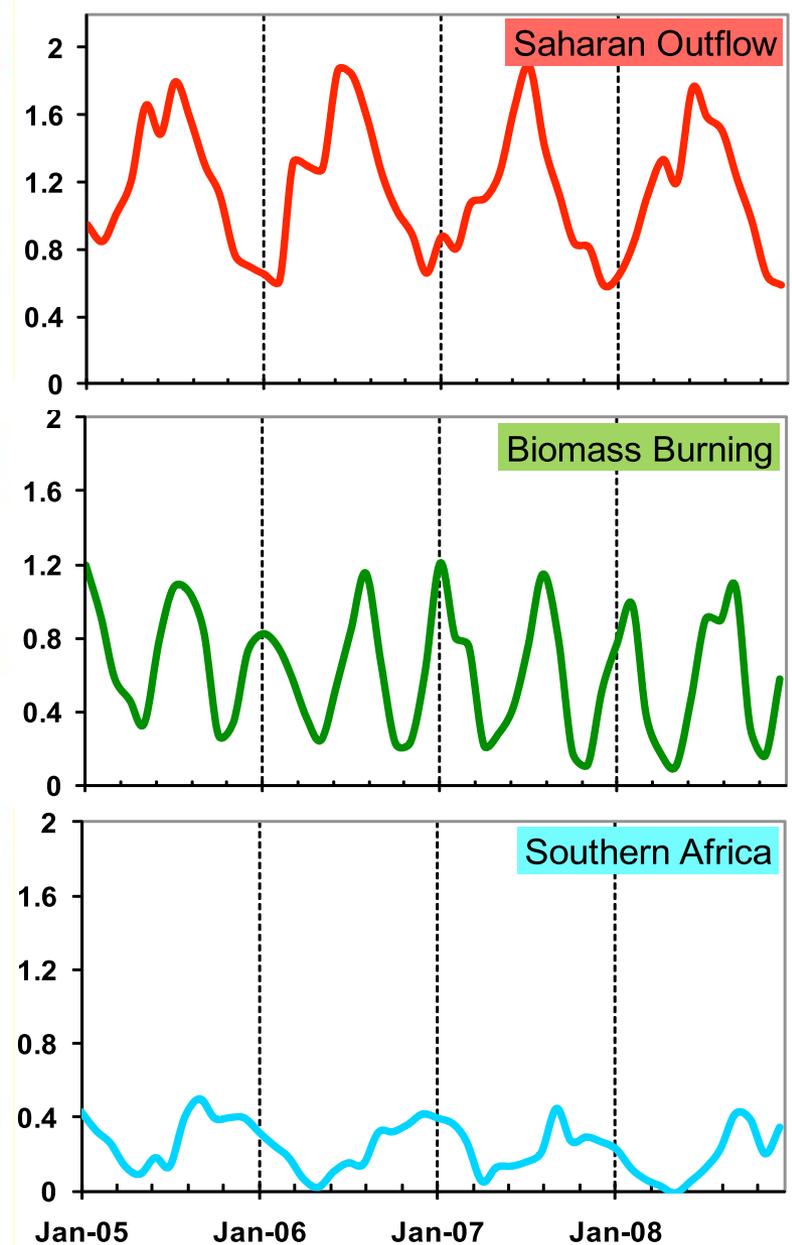
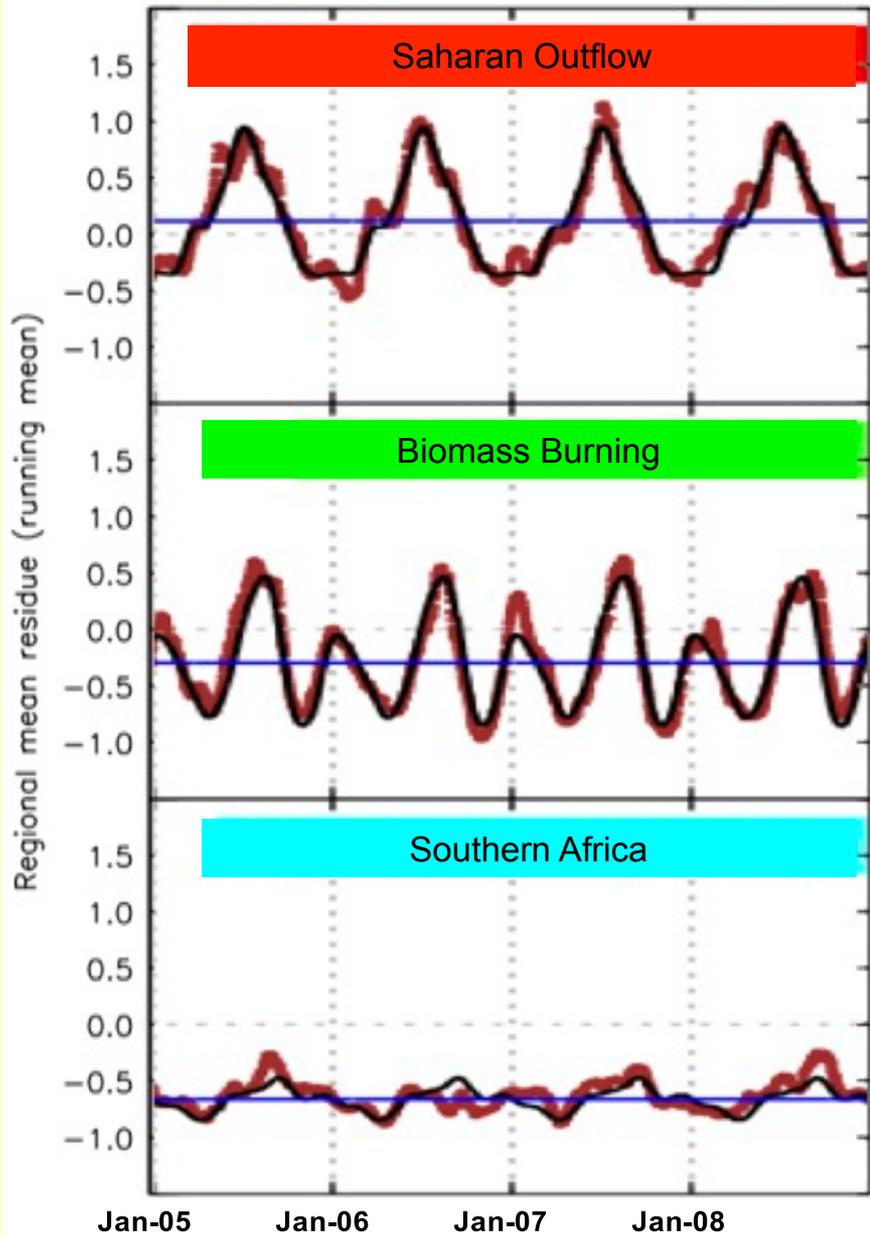


Regional Studies

- **3 African regions**
 - Rain, vegetation, and fire cycles
 - Ideal for monitoring both **desert dust** and **smoke**
- **Saharan outflow** (Region 1):
 - Primarily **Desert Dust**
- **Biomass burning** (Region 2):
 - **Intense biomass burning** and mixed source outflow
- **Southern Africa** (Region 3):
 - **Seasonal biomass burning** and some desert dust

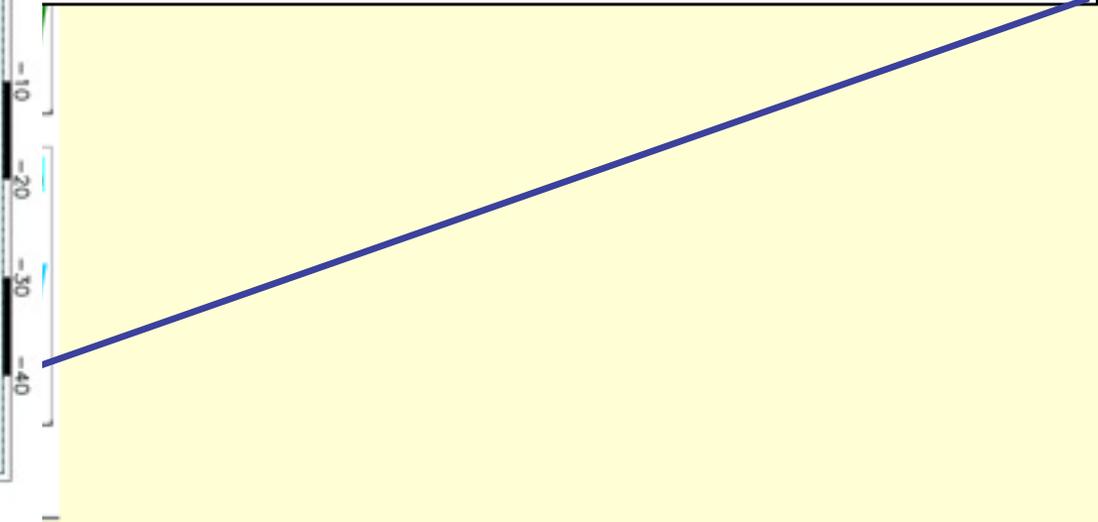
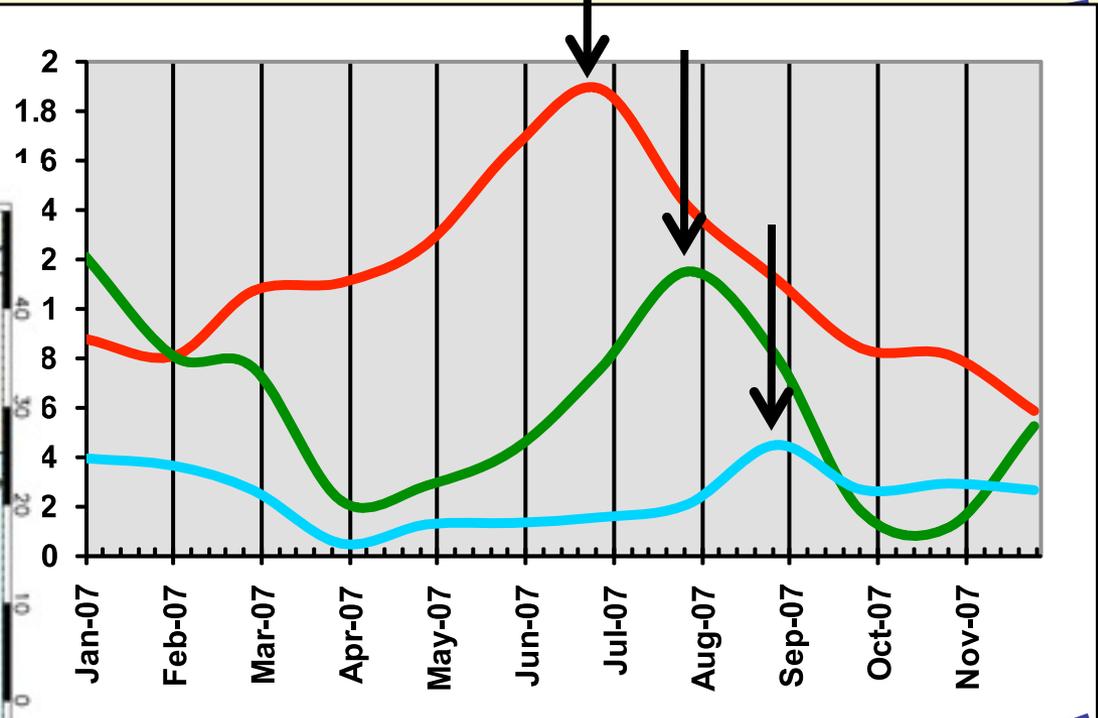
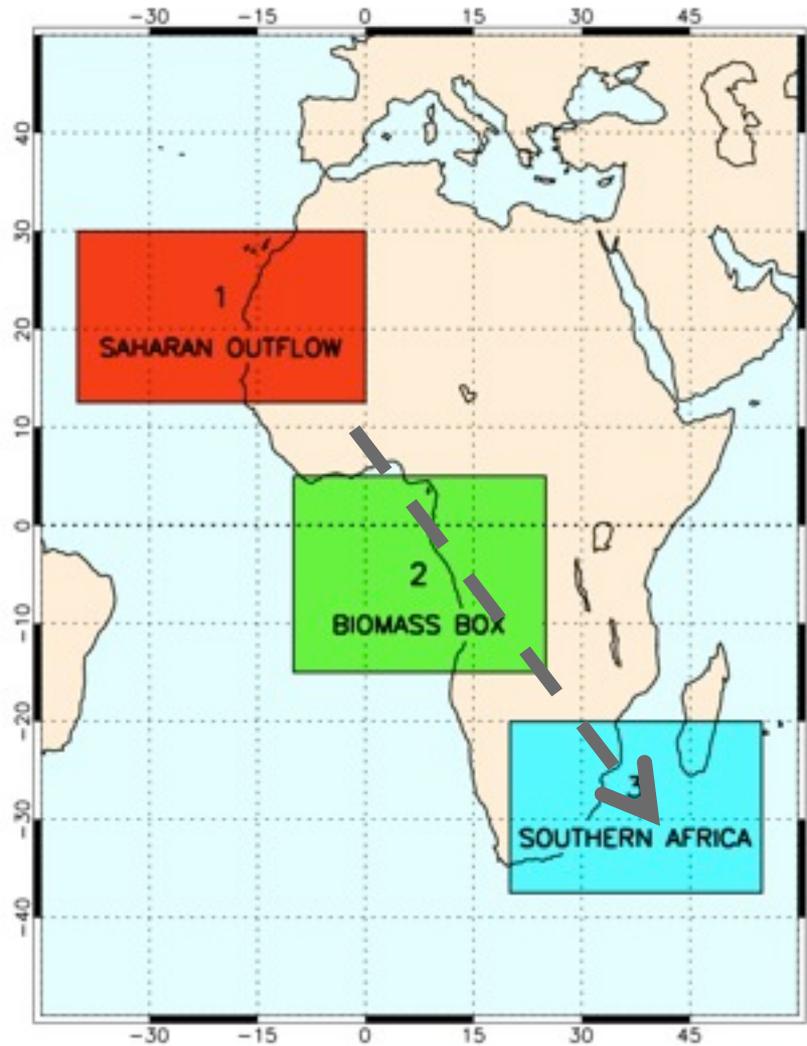


OMI Regional Data: 2005 - 2008

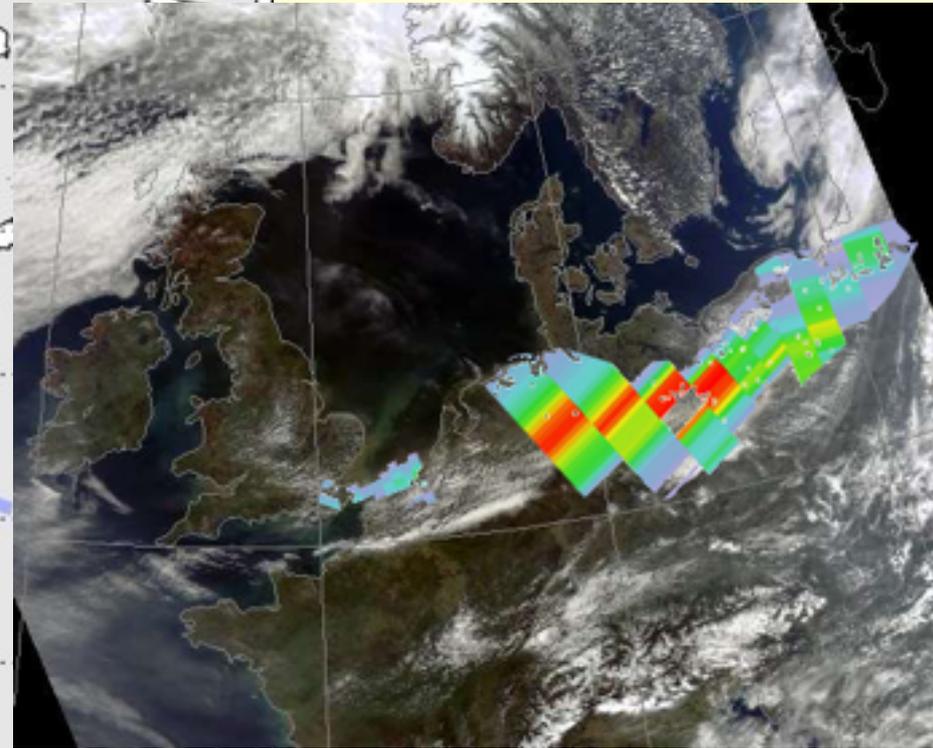
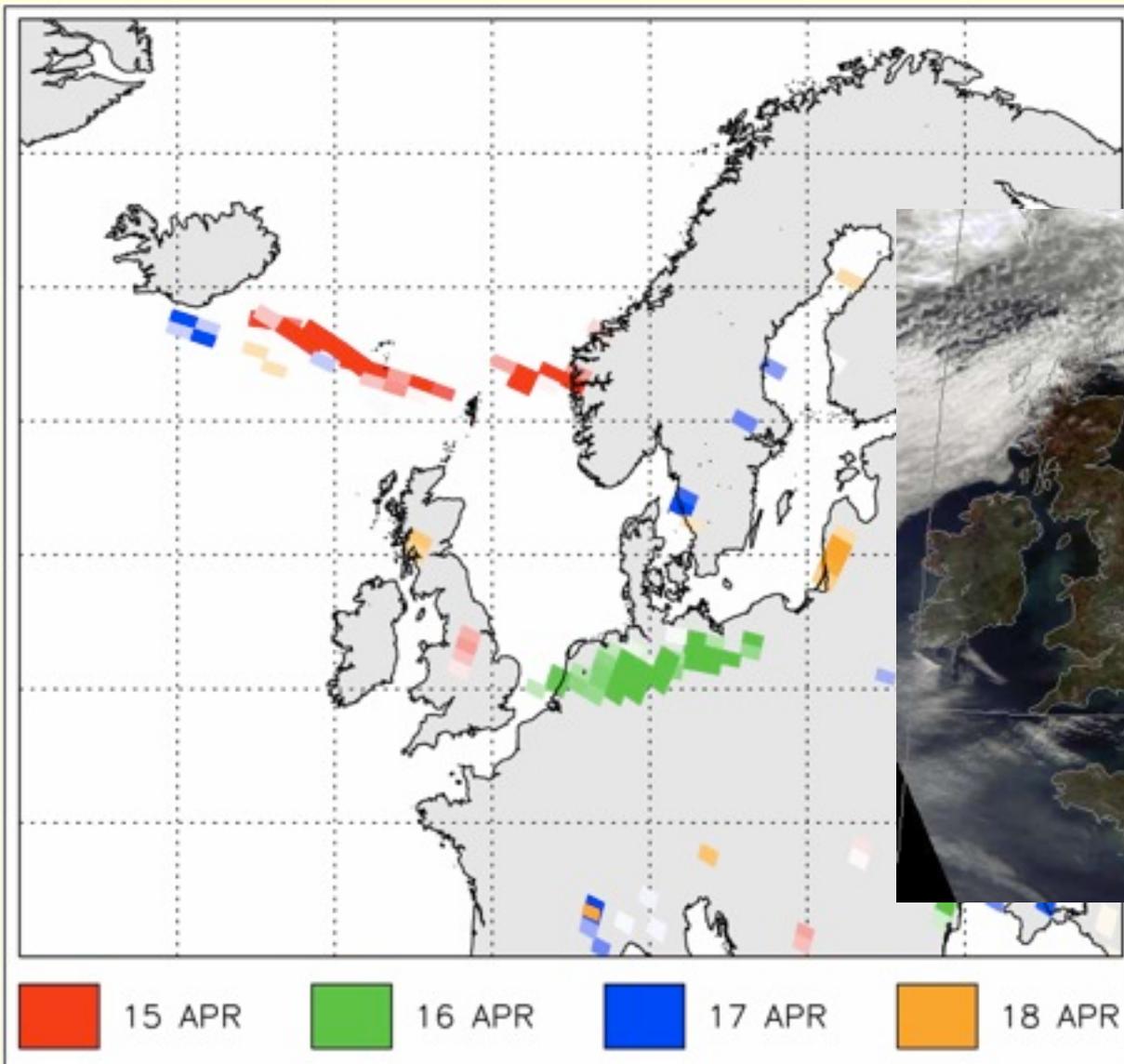


Zoom-in: African Seasonal Cycle

Temporal Peak Shift

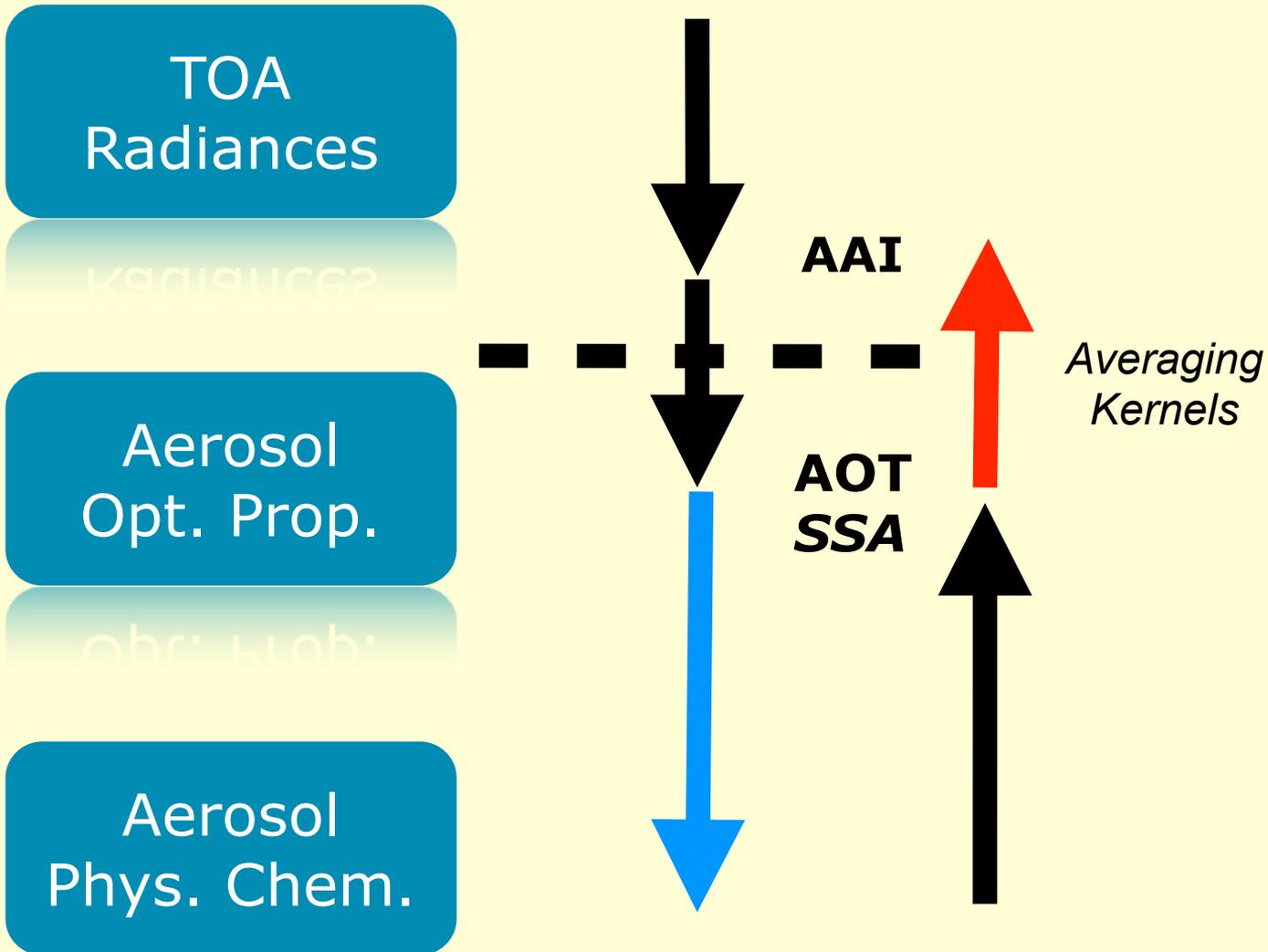


Icelandic Volcanic Ash Plume 2010



GOME-2 AAI Color coded by day

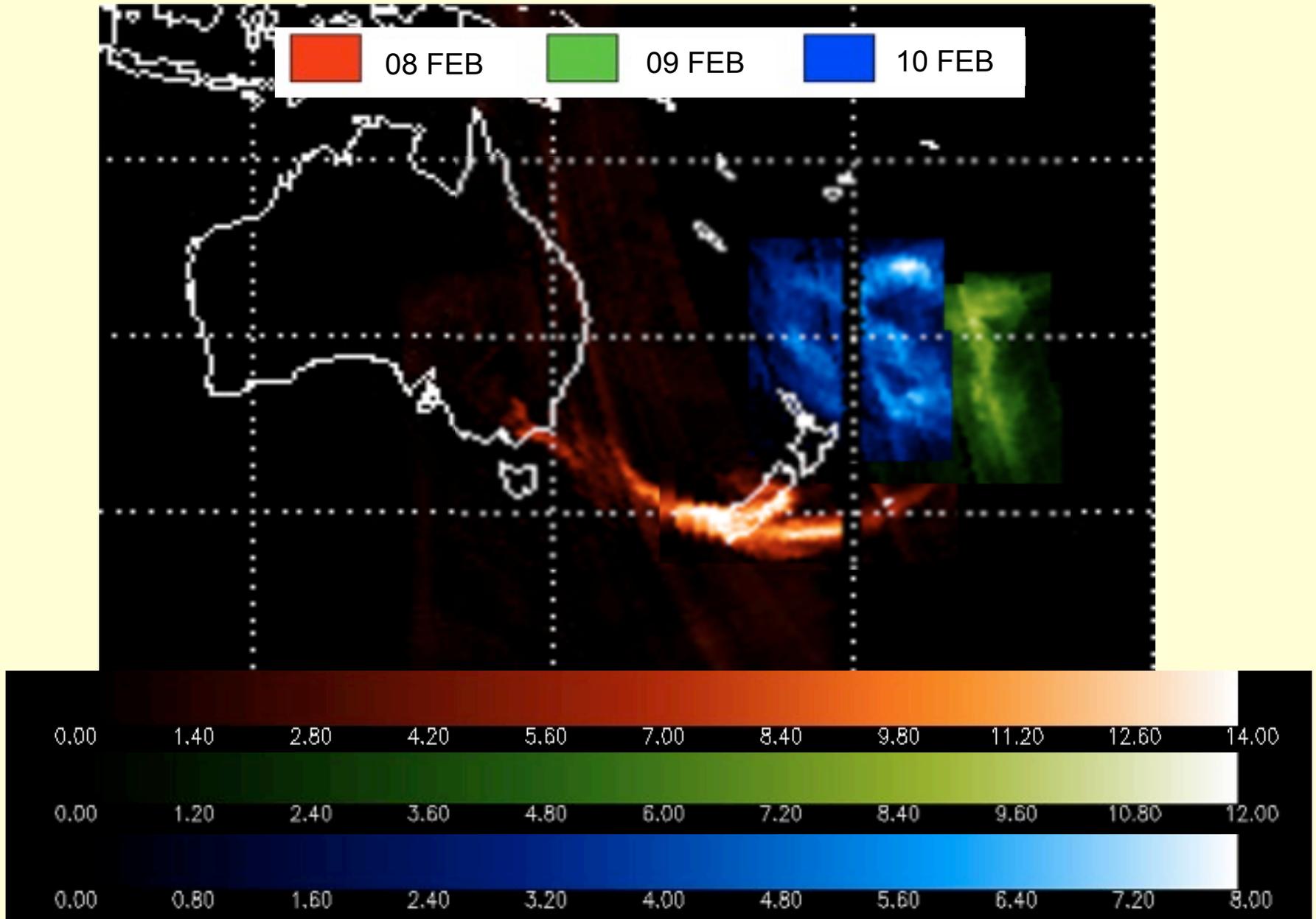
Satellite Model



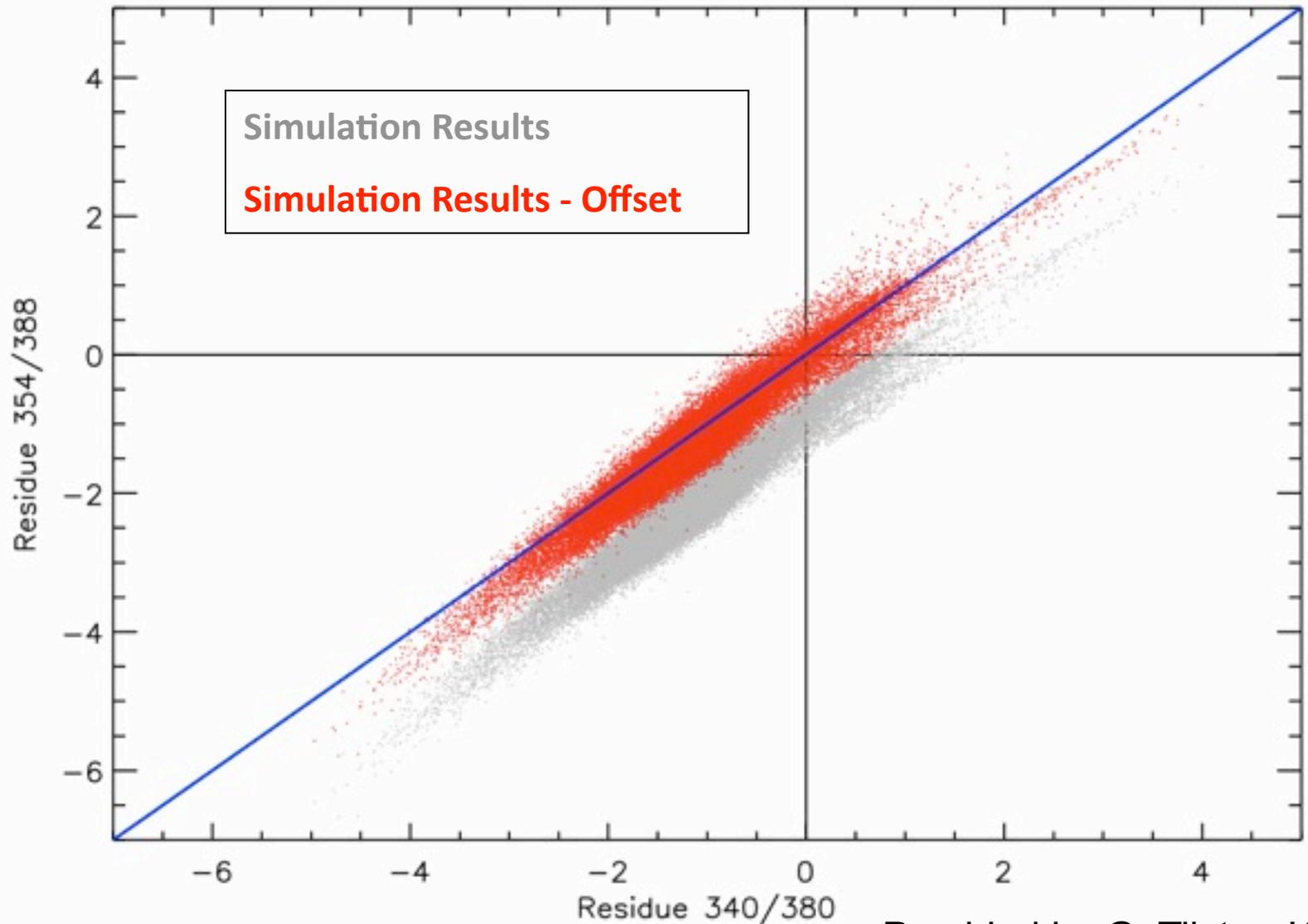
Summary & Conclusions

- Similarities of instruments allows for direct comparisons of AAI
 - Global mean time series have moderate agreement
 - Excellent agreement on a regional scale
- AAI key for trend monitoring and recording variability in seasonal cycling
 - Useful for observing both episodic and persistent aerosol source regions
 - Averaging kernels can provide tool to use the AAI quantitatively.
- Ability to detect aerosol in the presence of clouds, over varying of surface types is ideal for event tracking
 - Differing time of GOME-2 vs. OMI instrument overpass

Australian Bushfires 8-10 Feb 2009: OMI



354/388 nm VS. 340/380 nm



Provided by G. Tilstra, KNMI